



# Synesthetic hallucinations induced by psychedelic drugs in a congenitally blind man

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## ABSTRACT

This case report offers rare insights into crossmodal responses to psychedelic drug use in a congenitally blind (CB) individual as a form of synthetic synesthesia. BP's personal experience provides us with a unique report on the psychological and sensory alterations induced by hallucinogenic drugs, including an account of the absence of visual hallucinations, and a compelling look at the relationship between LSD induced synesthesia and crossmodal correspondences. The hallucinatory experiences reported by BP are of particular interest in light of the observation that rates of psychosis within the CB population are extremely low. The phenomenology of the induced hallucinations suggests that experiences acquired through other means, might not give rise to “visual” experiences in the phenomenological sense, but instead gives rise to novel experiences in the other functioning senses.

## 1. Background

Hallucinations induced by psychedelic drugs often cause synesthesia-like experiences (Luke & Terhune, 2013), in which a sensorial stimulus in one modality will consistently and involuntarily produce a second concurrent experience in a different one (Ward, 2013). Acquired synesthesia (Proulx, 2010; Proulx & Stoerig, 2006) or that attributed to drug ingestion, convolve sensory experience from multiple modalities and elicit phenomenon that are not experienced solely in the ‘mind’s eye’, but instead are projected onto a person’s reality in real time (Sinke et al., 2012). For example, hearing sounds may trigger a “visual” perception of gustatory flavours (Beeli, Esslen, & Jäncke, 2005) or colors (Marks & Mulvenna, 2013). LSD has been shown to robustly induce a form of audio-visual synesthesia in a placebo-controlled study in healthy subjects (Terhune et al., 2016) and similar experiences in other studies that did not evaluate the induction of the experiences in a synesthetic framework (Schmid et al., 2015; Carhart-Harris et al., 2016; Liechti, Dolder, & Schmid, 2017). Note that these studies, and the current investigation, are not examining developmental synesthesia, where a person has the condition and a number of its accepted characteristics, such as consistency of the evoked experiences. However, are all characteristics of developmental synesthesia necessary for the labels of synthetic or temporary-acquired synaesthesia (Proulx & Stoerig, 2006). A number of researchers have argued that consistency might not be a necessary “gold standard” for the reality of a synesthetic experience, as having a plastic evoked response to an inducer does not necessarily negate its existence (Ward & Mattingley, 2006; Simner, 2012). Therefore even though Terhune and colleagues (2016) might not have found that the LSD-induced experiences were consistent, this does not necessarily suggest that it differs from all forms of developmental synesthesia. LSD-evoked synesthetic experiences include marked increases in self-rated visual scale items such as: “sounds seemed to influence what I saw”; “the shapes of things seemed to be changed by sounds and noises”; and “the colors of things seemed to be changed by sounds” (Liechti et al., 2017). Although most studies have focused on developmental synesthesia, which is posited to arise from existing cross-modal

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connectivity in the brain (Roux, Scholte, & Colizoli, 2011), research on acquired synesthesia also highlights interesting results. As the plasticity of the nervous system allows the recognition and translation of auditory or tactile patterns into visual images, acquired synesthesia can be triggered not only through psychedelic drugs, as covered in this report, but also through assistive technology such as sensory substitution devices. This non-invasive assistive technology triggers experiences in one modality by converting one type of sensory signal into a different one (Bach-y-Rita, 1967; Proulx, 2010; Ward & Meijer, 2010). Drug induced synesthesia is both common (Griffiths, Richards, McCann, & Jesse, 2006, 2008; Schmid et al., 2015; Carhart-Harris et al., 2016; Preller et al., 2016; Liechi et al., 2017), and implicated in the production of visual inducers from auditory stimulation (Luke and Terhune, 2013). The most common hallucinogenic substances reported to evoke synesthesia-like experiences are mescaline (Marks, 1975), LSD (McKenna, 1982; Hofmann, 1983), cannabis (Marks, 1975), and ayahuasca (Shanon, 2003; Fotiou, 2012). Proulx and Stoerig (2006) noted that these sorts of synesthetic experiences can have very different origins, yet all might have an interesting application in helping to create sensory substitution devices that could evoke the missing sensory modality (e.g., vision) through stimulation of an intact senses (e.g., audition).

Synesthetic phenomena may also be promoted by neurological disorders, including thalamic lesions and sensory deprivation (e.g., blindness). For example, in late blind populations, sound has been shown to elicit 'visual' perceptions such as colored photisms (Niccolai et al., 2012; Armel and Ramachandran, 1999; Jacobs et al., 1981; Merabet et al., 2004). In a review on color synesthesia Safran and Sanda (2015) described an individual blinded by bilateral arteritic anterior ischemic optic neuropathy, who perceived colored photisms when brushing his teeth or hearing the sound of a handclap. In a second unusual case a late blind individual suffering from retinitis pigmentosa consistently reported seeing his limbs when they were in motion, with cross-modal activation between the visual cortex and proprioceptive inputs posited as an explanation (Safran & Sanda, 2015).

It has been observed that synesthesia-like events recounted by late blind individuals occur due to activation of the deafferented cortex (Merabet and Pascual-Leone (2010). While the visual cortex is recruited by other modalities to process sensory information in a functionally relevant manner, very little is known about how visual experience, or crucially the lack of it, impacts the phenomenology of synesthetic hallucinations induced by psychoactive substances. In visual deprivation, auditory to visual synesthesia is most common (Afra, Funke & Matsuo, 2009) implying that there might be an inordinate likelihood for cross-wiring between these senses in late blind populations. Of course, such "visual" experiences are not found in CB individuals who not only have been deprived of any previous visual experience but also lack the semantic framework to describe phenomena associated with sight.

In this paper, we provide a detailed insight into synesthetic hallucinations as a response to psychedelic drug use in a CB ex-rock music singer (or "rock star" by his own account), identified by the pseudonym Mr. Blue Pentagon (BP). BP's personal experience provides us with a unique report on the psychological and sensorial alterations induced by hallucinogenic drugs, including an account of the absence of visual hallucinations, and a compelling look at the relationship between LSD induced synesthesia and cross-modal correspondences.

## 2. Case report

BP gave informed, oral and written consent for the interview and publication of the results, with the research approved by the departmental ethics committee for the study of multisensory cognition in the visually impaired. BP was born in 1948, two months premature. Due to an over-saturation of oxygen at birth, he suffered from premature retinopathy causing him permanent, congenital blindness. From a young age, he listened to popular composers of the time and attempted to imitate their melodies on his piano at home, although he never received any formal lessons. His passion was kindled and he taught himself how to play the piano. By the age of 16, he was already performing solo in local bars and clubs. Though he worked in a bank for many years, his passion was always playing his own music for an audience and upon moving from his hometown and meeting two other blind musicians, he formed a rock music group. In 1971, after recording a song, the band relocated abroad for six months to work on a new album and by 1984, at the age of 36, BP was a professional keyboard player, singer and entertainer. After several years, his wild and extravagant lifestyle caught up with him (along with multiple incidences of equipment theft) and he decided to return to his day job in a bank, part time.

In the 1970s BP would regularly take a type of LSD called 'Blue Pentagon', named after its distinct shape and color. Additionally, he smoked large amounts of marijuana into his 40s, and experimented with other psychedelics such as mescaline and psilocybin (magic mushrooms).

When asked about his history with taking psychedelic drugs, BP described his experience as follows:

*"I started taking drugs at a very young age, but the one I felt the most connected with, apart from cannabis, was called 'Blue Pentagon', basically LSD! Every time I did acid, I experienced something new and spectacular. Obviously through the senses which are available to me I never had any visual images come to me. I can't see or imagine what light or dark might look like. With LSD and cannabis though, I experienced so much through my hearing, touch and emotions that it was already enough for me to take!"*

When under the effect of psychedelic drugs, sensory awareness and connection to emotion is commonly described as being significantly heightened. Magnified emotional experiences take on a profound meaning in the mind of the user, who becomes extremely receptive and susceptible to sounds, facial expressions, gestures, and minor changes within their immediate environment (Grinspoon & Bakalar, 1983, Kaelen et al., 2015). BP noted that during his psychedelic experiences, he felt drawn towards playing with his own voice, often calling out-loud with strange voices and personas:

*"There was a marked difference between hallucinations and dreaming. On acid, I definitely knew that I was awake, although on unfamiliar territory: not like dreaming. During my psychedelic experiences, whenever I listened to music, I felt as if I was immersed in the most*

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